

**Bellwork: 2/27/13**

**Find all the possible rational roots for the polynomial below:**

$$y = 2x^4 - 11x^3 - 6x^2 + 64x + 32$$

1, 2, 4, 8, 16, 32  
1, 2  
 $\pm 1, \pm 2, \pm 4, \pm 8, \pm 16, \pm 32, \pm \frac{1}{2}$

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NAME \_\_\_\_\_  
PERIOD \_\_\_\_\_

**Example 1:** Find the actual zeros of  $f(x) = x^4 + x^3 - 13x^2 - 25x - 12$ .

Maximum # of roots: 4

Possible rational roots:  $\pm 1, \pm 2, \pm 3, \pm 4, \pm 6, \pm 12$

Factored form:  $(x+3)(x+1)(x+1)(x-4)$

Actual roots:  $-3, -1, -1, 4$

Work:

$$\begin{array}{r|rrrrrr}
 -3 & 1 & 1 & -13 & -25 & -12 \\
 & \downarrow & & & & \\
 & -3 & 6 & 21 & 12 & \\
 \hline
 -1 & 1 & -2 & -7 & -4 & 0 \\
 & \downarrow & & & & \\
 & -1 & 3 & 4 & & \\
 \hline
 & 1 & -3 & -4 & 0 & 
 \end{array}$$

$x^2 - 3x - 4$   
 $(x-4)(x+1)$   
 $x-4=0 \Rightarrow x=4$   
 $x+1=0 \Rightarrow x=-1$

**Example 2:** Find the actual zeros of  $f(x) = x^3 + 2x^2 - 7x - 2$ .

Maximum # of roots: 3

Possible rational roots:  $\pm 1, \pm 2$

Factored form:  $(x-2)(x^2+4x+1)$

Actual roots: 2

Work:

$$\begin{array}{r|rrrr}
 2 & 1 & 2 & -7 & -2 \\
 & \downarrow & & & \\
 & 2 & 4 & -1 & \\
 \hline
 & 1 & 4 & 1 & 0
 \end{array}$$

$x^2 + 4x + 1$

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**Example 3:** Find the actual zeros of  $f(x) = x^3 + x^2 - 2x - 8$ .

Maximum # of roots: \_\_\_\_\_

Possible rational roots: \_\_\_\_\_

Factored form: \_\_\_\_\_

Actual roots: \_\_\_\_\_

*Work:*

# HOMework

**Example 4:** Find the actual zeros of  $f(x) = x^4 + 2x^3 - 8x - 16$ .

Maximum # of roots: \_\_\_\_\_

Possible rational roots: \_\_\_\_\_

Factored form: \_\_\_\_\_

Actual roots: \_\_\_\_\_

*Work:*

